

## LIGATION OF BOTH COMMON CAROTID ARTERIES.

REPORT OF A CASE IN WHICH THE RIGHT COMMON CAROTID ARTERY WAS  
LIGATED FOR INOPERABLE SARCOMA, WITH TEMPORARY IMPROVEMENT;  
LIGATION OF THE LEFT COMMON CAROTID SIXTY-NINE DAYS AFTER THE  
FIRST OPERATION.

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THE report of the following case is from the service of  
Dr. A. C. Wood, in the Philadelphia Hospital.

J. S., colored; thirty-two years old; laborer; was admitted to the hospital June 1, 1903, with the history that two years ago, shortly after beginning to work in a chemical factory, his nose began to bleed at intervals, and he began to have pains in his head. These symptoms have continued to the present time with increasing severity. He has lost weight and strength. For the past six or eight months his right eye has gradually become more and more protruded.

On admission to the hospital he complained of weakness, pains in his head, difficulty in walking, and great difficulty in masticating and swallowing food. In appearance he was poorly nourished. The right eye extended beyond the bridge of the nose. On the right side, evidently involving the pterygomaxillary region, a mass was visible protruding from behind the lower jaw, and apparently attached to it. The jaw protruded somewhat near the angle, and considerable induration of the soft tissues existed below the jaw.

Examination of the nose and mouth on the affected side showed that the breathing was occurring almost entirely by the mouth. The right nasal cavity was completely obstructed by a mass of swollen tissue, which bled freely when touched by instruments. The turbinates on this side were not visible. The left nasal cavity was somewhat obstructed, but not entirely. That

the tumor was growing forward and inward was shown by the fact that the eye was protruding, and that the nose and mouth were involved by the growth on that side. Another small mass was evident in the parotid region of the opposite side, not involving the jaw.

The diagnosis of sarcoma was made. It is recorded in the notes that on June 10 the patient was prepared for operation, but that this was abandoned because of the difficulty in administering the ether.

After studying the case carefully, it was decided that the only justifiable operation was ligation of the common carotid artery, not with the idea of effecting a cure, which was manifestly impossible, but of affording at least temporary relief.

On July 22 Dr. Wood ligated the right common carotid under local anæsthesia by the Schleich method because of the previous difficulty in inducing general anæsthesia. The patient complained very little of pain during the operation. There were no cerebral symptoms at the moment the ligature was tied, or subsequently. The wound healed by first intention.

A slow but positive improvement followed the operation, as was shown best by the diminished frequency of the hæmorrhages from the nose, marked relief from pain in the head, and general comfort of the patient. The mass diminished perceptibly in size.

On September 24 it was noted that the hæmorrhages and the pains in the head were recurring. Ligation of the left external carotid was now considered and suggested to the patient, who readily agreed to it.

On September 29 the writer operated under cocaine with this object in view. The incision was made along the anterior margin of the sternomastoid muscle, from the angle of the jaw, about three inches downward. This was deepened until the digastric and stylohyoid muscles came into view. The internal jugular vein and common carotid artery were exposed, and followed upward from the upper border of the thyroid cartilage to well above the angle of the jaw. The artery gave off no branches in any direction, the search being made particularly in the submaxillary region. Finally, on working upward under the jaw, a group of vessels could be seen, apparently passing from the main artery towards the mouth and chin. These were believed to be the lingual or facial vessels or both. Because the patient

was under a local anæsthetic, and was showing symptoms of shock, although he had lost little blood, it was considered unwise to search further for the external carotid. It was now necessary to decide between closing the wound and placing a ligature on the common trunk. As the character of the tumor and its situation placed any other hope of relief out of the question, it was decided to tie that vessel. By the following morning the patient had passed into a condition of coma; the muscles of the back were rigid; the hands twitched, and the breathing was stertorous. He died later in the day.

The points of interest in this case are:

1. The presence of a malignant growth, which was so situated that radical removal was impossible, but which caused so much distress that some relief was urgently called for.

2. The impossibility of administering a general anæsthetic which had been demonstrated by previous attempts, and the successful and satisfactory ligation under local anæsthesia.

3. The temporary improvement which followed and was apparent to the patient and all those who saw him, in spite of the advanced stage of the disease at the time the operation was undertaken.

4. The high division of the common carotid which was demonstrated at the time of the second operation. This point was not observed on the right side, as the common trunk only was sought.

Such a high division of the common carotid is very rare. The writer, who performed the second operation, could not, from a comparatively long experience as a demonstrator of anatomy, recall such an anomaly in the cadaver.

In connection with the report the following facts are of interest:

According to the anatomical text-books of Morris, Gray, and Quain, an abnormally high division of the primitive carotid is more common than a low one. Normally, the bifurcation of the common trunk occurs opposite the upper border of the thyroid cartilage. W. J. Walsham ("Morris's Anatomy") says that the division may take place as high as the hyoid

bone, or even the styloid process (which is above the angle of jaw).

Authorities differ as to the dangers of ligating the only patulous carotid. Early writers, especially Galen, Valsalva, Morgagni, and Van Swieten, concluded, from experimentation on animals, that in these both carotids might be tied without serious results. This in the main was corroborated later by Bichat, Mayer Cooper, Mott, Jobert, and Porta. Sir Astley Cooper and Porta differed as to the comparative importance of the carotid and vertebral arteries. It was believed by Cooper that the carotids supplied the external parts of the head rather than the brain, and that only in the more advanced brains, as in man, did the carotids assume greater importance. Ligation of both carotids, according to Cooper, therefore, would not be followed by the same degree of cerebral disturbance as in man. Porta believed that the vertebrals were of no more importance to the brain than the carotids.

James Miller (*London and Edinburgh Monthly Journal*, 1842) held that, in view of the results of M. Jobert on animals, in the future the surgeon need not hesitate to secure both common carotids by ligature simultaneously, should circumstances imperatively demand it. Wardrop was also much inclined to this view. According to this authority, the blood supply is so abundant after ligature of the carotid that there is not the slightest danger to the parts within or without the cranium, from which the main stream has been diverted, "and no one now entertains the slightest fear for the intellectual and other functions of the brain."

Cheever (*London Medical Gazette*, 1855) believed this view to be both erroneous and dangerous.

Many instances are recorded in which one or both carotids were obliterated in man without destroying the life of the individual. Although in some instances delirium, convulsions, adynamia, phlebitis, thoracic and cerebral troubles have in many cases followed, yet in the aggregate the results have been more fortunate.

Pilz, of Breslau, in 1868, collected 600 cases in which the

common carotid had been tied. In twenty-seven both arteries were ligated. He found that the most common cause of death was cerebral disease. Of 386 cases of single ligature, ninety-six showed cerebral symptoms (about 25 per cent.); over one-half of the ninety-six died.

Of the twenty-seven double ligations, five were fatal. Two deaths occurred from cerebral disturbances, while in another case, in which convulsions took place, death did not result. Three others showed temporary disturbances of vision. In only one case were the two carotids tied simultaneously, the interval between the ligatures being only a few minutes; coma and death resulted. When the two sides were ligated, with some days or weeks intervening, the operation was not more frequently followed by cerebral disturbances than when only one was tied.

G. W. Norris, in 1847, from the records of the Pennsylvania Hospital, collected forty-two cases of ligation of the common carotid. Of these thirteen died. In his opinion, the operation of ligating this artery was too generally looked upon as one of comparatively little danger.

J. E. Erichsen, in his work on surgery ("The Science and Art of Surgery"), reached the following conclusions:

1. Ligature of one carotid artery is followed by cerebral disturbances in more than one-quarter of the cases, above one-half of which are fatal.

2. When the two carotids are ligated with an interval of some days or weeks, the operation is not more frequently followed by cerebral disturbances than when only one is tied.

3. Pathological investigation has shown that if the vessels be gradually and successively obliterated the patient may live, although one carotid and one of the vertebrals have been occluded by disease, and the other carotid ligatured, as in a case related by Rossi.

4. As in a case recorded by Davy, an individual may even live for a considerable time, though both carotids and both vertebrals be occluded, the cerebral circulation being maintained through the medium of the anastomoses of the inferior

and superior thyroids, and the deep cervical with the occipital artery.

5. The reason why more or less extensive obstruction of the arteries leading to the brain, by disease, may, as appears from pathological records, be unattended with cerebral disturbance, while this so frequently follows ligature (as has been pointed out by Pilz), is that in the former case the obstruction is gradual, so that the collateral circulation has time to be established, while in the latter, interruption is sudden.